

L. Castagnolo* & C. D'Antonio**

SPHAERIOIDEA IN THE ASTRONI LAKES, CAMPI FLEGREI: FIRST REPORT OF *PISIDIUM OBTUSALE* (LAMARCK) AND *PISIDIUM MILIUM* HELD, IN CENTRAL-SOUTHERN ITALY***

KEY WORDS: Sphaerioidea, *Pisidium obtusale*, *Pisidium milium*, central-southern Italy

Riassunto

Viene segnalata la presenza di alcune popolazioni di *Pisidium obtusale* (LAMK.) e di *Pisidium milium* HELD in alcuni piccoli stagni perenni formati in depressioni di origine vulcanica nella zona dei Campi Flegrei (NA).

La segnalazione riveste una certa importanza poiché le due specie, ben note ed abbastanza diffuse nell'Europa Centrale, erano state finora, sporadicamente segnalate in Italia solo in alcune Regioni Settentrionali: in Piemonte, Trentino - Alto Adige e Liguria il *Pisidium milium* ed in Trentino - Alto Adige e Liguria il *Pisidium obtusale*.

Summary

Pisidium obtusale (LAMK) and *Pisidium milium* HELD were found in small ponds of volcanic origin in the Campi Flegrei, West of Naples.

These two species which are quite common in central Europe, had previously been found in Italy only in some northern Regions (Piemonte, Liguria, Trentino and Emilia Romagna).

Index

- 1 - Introduction
- 2 - The study area
- 3 - *Pisidium obtusale* (Lamarck) and its distribution in Italy and Europe
- 4 - *Pisidium milium* Held and its distribution in Italy and Europe
- 5 - Conclusions
- 6 - References

* Department of Environmental Biology, Via della Cerchia, 3 - 53100 Siena

** Via A. Falcone, 386 B - 80127 Napoli

*** A financial contribution for this work was received from the Italian Education Ministry «60%» fund. Lavoro accettato il 30 novembre 1990

Introduction

During a series of malacological studies in several lakes in the Campi Flegrei area, west of Naples, some populations of bivalve molluscs of the families Sphaeriidae and Pisidiidae were found. Specimens of *Pisidium obtusale* (LAMK.) and *Pisidium milium* HELD were found together with the common Italian species: *Pisidium casertanum* (POLI), *Pisidium personatum* MALM and *Musculium lacustre* (MÜLLER).

The first two species have holoarctic distribution, and are quite common in the north of Europe. In Italy, however, they have only been reported in the northern Regions (Piemonte, Liguria and Trentino for *P. milium* and down to Emilia Romagna for *P. obtusale*) (ALZONA 1971, CASTAGNOLO et al. 1980).

The study area

The property «Astroni» (Fig. 1) in the Campi Flegrei area, west of Naples, is a volcanic structure which developed about 3700 years ago (ALESSIO et al. 1973). It is elliptical in shape, with a major axis of about 2000 m and a surface area of about 247 ha (SCARAMELLA & FIMIANI, 1979).

It contains a crater with three small lakes, each having different ecological parameters (Fig. 1). It appears that the crater has undergone many changes over the years as far as the submerged areas are concerned. CARLETTI (1787) and SCHERILLO (1844) refer to three or more small lakes, whereas MONTICELLI (1914) speaks of a single large lake.

The present situation is as follows:

1) Cofaniello Grande appeared quite recently; it has a surface area of about 800 m² and a maximum depth of 50 cm. Only a small proportion of the surface is free of vegetation, which consists essentially of *Typha latifolia*, *Salix caprea* (only in the middle), *Phragmites communis*, *Juncus* sp., *Lemna trisulca* and *Riccia fluitans*. There is an abundance of decomposing material on the bottom.

2) Cofaniello Piccolo (or Middle lake) has a larger surface area than Cofaniello Grande, and is shallower in the northern part (5-60 cm) where it is completely covered in *Typha latifolia* (dominant), *Juncus* sp., *Phragmites communis* and *Sparganium erectus*. Its southern part is deeper (max. 1.10 m) and almost completely covered by *Lemna trisulca* (dominant), *Lemna minor* and *Riccia fluitans*. The bottom consists of rotting leaves and plant matter.



Figure 1 - Map of the Astroni crater showing the three small lakes in which sampling was performed.

3) Lago Grande is more or less quadrangular with a surface area of about 1.50 ha and a maximum depth, near the middle, of about 3.50 m (D'ANTONIO & BRAVI, 1990). The part free of vegetation is less than half; the plant species present are mostly *Phragmites communis*, *Typha latifolia*, *Sparganium erectus*, *Salix caprea*, *Juncus* sp., *Azolla filiculoides*, *Lemna trisulca* and *Lemna minor*. There is also *Nymphaea alba* which was introduced last century (MONTICELLI, 1914).

The present study was carried out between 13.IV.1986 and 3.VII.1987 with monthly excursions. Specimens were collected by sifting the mud and plant detritus from the bottom, using a qualitative dredge and a fine meshed sieve, and also by examining the submerged stems of canes and water plants.

Pisidium obtusale (LAMARCK, 1818) (Fig. 2)

Pisidium obtusale (LAMARCK) has a quite distinctive shell: it is oval and rather full with a very wide, prominent, backward-pointing umbo. The hinge is fine with a peculiar P₃ on the right shell which very well characterizes the species. It is partially attached to the base of P₁ and, curving back over it, forms a distinctive thickening known as «*pseudocallus*». The cardinal teeth are also a distinctive character: they are small and fine and situated on the inner edge of the hinge, often pointing inwards.

Reliable data indicates that the maximum dimensions of this species are: length = 3.75 mm, height = 3.5 mm and thickness = 3.4 mm (CASTAGNOLO, FRANCHINI & GIUSTI, 1980).

The maximum dimensions registered in the Astroni specimens are: length = mm 3.1, height = 2.5, thickness = 2.3 mm.

Pisidium obtusale has been reported up to an altitude of 1300 m, and seems to be very frequent in marshy ponds, peat-bogs and marshlands rich in aquatic plants, as confirmed by the present data. It is less common in running water or big lakes.

This species was found in all three of the Astroni lakes.

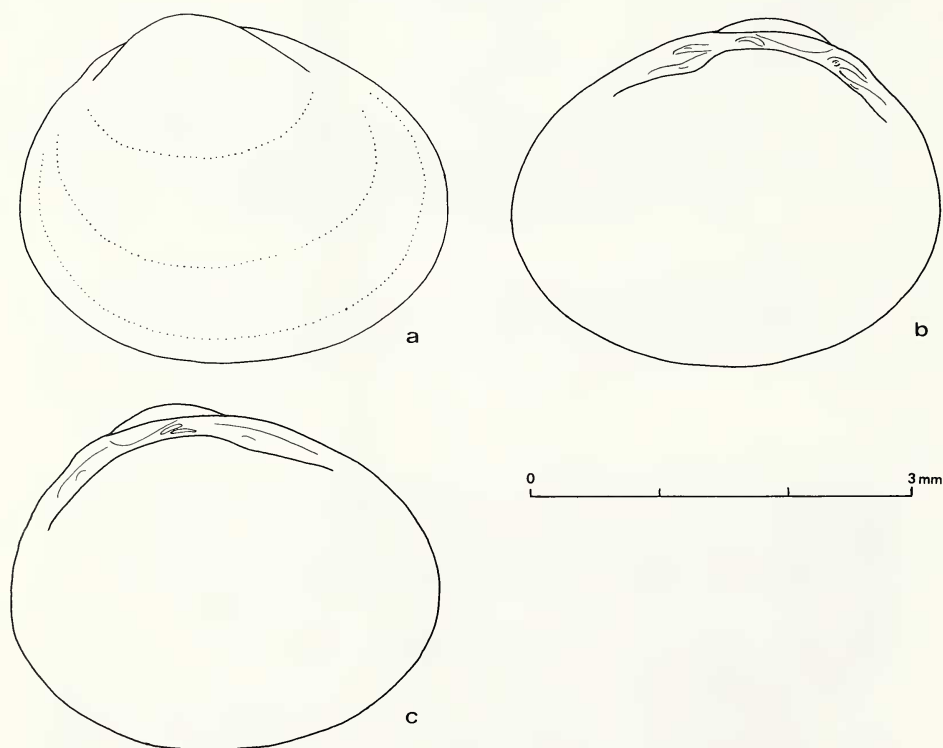


Figure 2 - The shells of *Pisidium obtusale* (LAMK.) found in the Astroni lakes: right shell (a, b); left shell (c).

***Pisidium milium* HELD, 1836 (Fig. 3)**

Pisidium milium HELD is characterized by very inflated, typically sub-trapezoid shells, shiny yellow to yellowish-brown on the outside with clear concentric growth lines. The anterior and posterior margins are sometimes almost truncated, and always form quite sharp angles with the upper and lower margins, which are generally only slightly arched, giving the shell its typical subtrapezoid shape. The umbo is generally very inflated, rounded and located more or less posteriorly.

The hinge is not very robust, and is narrower in the centre and wider at its ends. It has small fine cardinal teeth with C₂ and C₄ more or less parallel. The cavity of the ligament is long and narrow.

According to data in the literature (CASTAGNOLO et al., 1980) the maximum dimensions are: length=3.7 mm, height=3,1 mm, thickness=2.7 mm.

It is a species typical of ditches, marshes and ponds or still water in general, and can be found up to an altitude of 2300 m (MOUTHON & KUIPER, 1987).

It was found solely in Lago Grande, the only lake which has not dried up in the recent past.

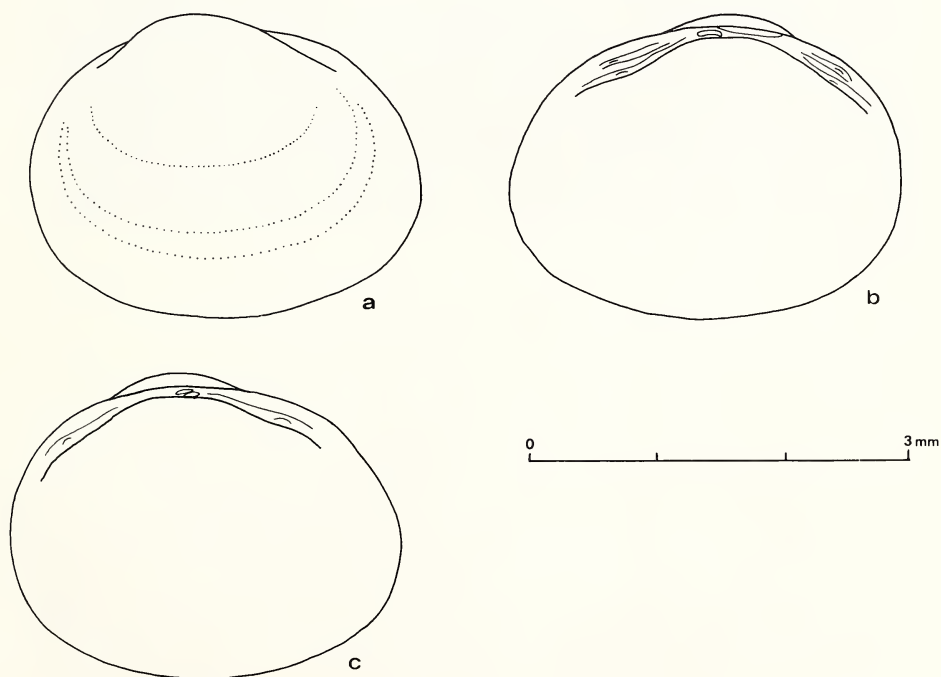


Figure 3 - The shells of *Pisidium milium* HELD found in Lago Grande: right shell (a, b); left shell (c).

Conclusions

Studies of the malacofauna of the Astroni lakes, for some time a candidate for the status of protected Natural Reserve, have brought to light much interesting limnological and biological data, and have also made it possible to extend the distribution in Italy of two small species of bivalve molluscs belonging to the Sphaeriidae family: *Pisidium obtusale* (LAMARCK) and *Pisidium milium* HELD. These species had only been reported with certainty in Piedmont, Trentino Alto Adige and Liguria (*Pisidium milium*) and in Trentino Alto Adige and Emilia Romagna (*Pisidium obtusale*) (ALZONA 1971, CASTAGNOLO et al. 1980) but in 1964, KUIPER hypothesized that they might extend at least to other areas of the northern Apennines.

The finding of living specimens of *P. obtusale* and *P. milium* in the Astroni lakes confirms this forecast and together with the finding of *Pisidium henslowanum* (SHEPPARD) in the lake of Campotosto in Abruzzo (CASTAGNOLO & BAZZANTI, 1985), emphasizes the need for more detailed field studies in order to solve the problem of the distribution of freshwater bivalves in the Italian peninsula. The third species had also been reported in northern Italy.

In view of the isolation of the Astroni area and its recent origin, it seems feasible that the presence of *P. obtusale* and *P. milium* in these lakes is due to passive transport by birds. However anthropic transport with aquatic plants (as in the case of *Nymphaea* sp.) is another possibility.

All this suggests that other populations of these two species may be present in the area. Further studies in the largely unknown marsh environments of the Italian peninsula and the islands are therefore advisable, and could lead to a considerable extension of the distributions of many species of freshwater bivalves. This is especially true for the Sphaeriidae, which because of their small size and particular habitat, often escape observation in less careful studies or research performed with unsuitable equipment.

REFERENCES

- ALESSIO M., BELLA F., BELLUOMINI G., CALDERONI G., CORTESI C., IMPROTA S., TURI B., 1973 - University of Rome Carbon-14 dates Radiocarbon, **15** (1): 165-178.
- ALZONA C., 1971 - Malacofauna Italiana. *Atti della Soc. Ital. Sc. Nat. e Mus. Civ. St. Nat. di Milano*, **3**: 223-242.
- BATTAGLINI P., PERCUOCO G., 1967 - Osservazioni ecologiche sulla fauna limnologica del lago craterico di Astroni (Campi Flegrei) *Boll. Soc. Natur.* Napoli, **76**: 229-236, 2 Tavv.
- CARLETTI N., 1787 - Storia della regione abbruciata in campagna felice. Stamperia Raimondiana, Napoli, pp. 45.
- CASTAGNOLO L., BAZZANTI M., 1985 - Prima segnalazione di *Pisidium benslowanum* (SHEPARD) (*Mollusca: Bivalvia*) nell'Italia Appenninica. *Boll. Malacologico*, Milano, **21** (7-9): 217-224.
- CASTAGNOLO L., FRANCHINI D., GIUSTI F., 1980 - Guide per il riconoscimento delle specie animali delle acque interne italiane. 10. Bivalvi. Collana del Progetto Finalizzato «Promozione della Qualità dell'Ambiente». C.N.R. AQ/1/49. 64 pagg.
- D'ANTONIO C., BRAVI S., 1990 - Ricerche naturalistiche nella tenuta Astroni. I. La malacofauna acquatica. *Atti Convegno Soc. Ital. Malac.*, Sorrento, 28-30 maggio 1987.
- GERMAIN L., 1931 (1969) - Mollusques terrestres et fluviatiles. 2. In: Faune de France, **22**: 479-897, 390 Figg., 13 tavv. Paris.
- KUIPER J.G.J., 1964 - Aperçu sur la distribution du Genre *Pisidium* en Italie. *Atti Soc. Ital. Sc. Nat. e Museo Civico St. Nat. di Milano*, **103** (3): 223-242.
- MONTICELLI F.S., 1914 - Il cratere di «Astroni» nella Campania. *Ann. Zool. R. Univ. Napoli*, n.s., suppl., Fauna degli Astroni, **1**: 22 pagg., 15 inc.
- MOUTHON J., KUIPER J.G.J., 1987 - Inventaire des *Sphaeriidae* de France. Museum National d'Histoire Naturelle. Inventaires de Faune et de Flore, Fasc. 41: 62 pp.
- SCARAMELLA D., FIMIANI P., 1979 - Riserve naturali e biotopi in Campania. Breve censimento aggiornato delle proposte e consuntivo di alcune esperienze. *Atti VIII Simp. Naz. Conserv. Nat.*, Bari: 435-457, 4 figg.
- SCHERILLO G., 1844 - Dall'aria di Baia al tempo dei Romani e di una meravigliosa spelunca scoperta nelle vicinanze di Cuma. R. Tipografia Militare. Napoli.
- STABILE V., 1979 - Relazione illustrativa sullo stato attuale della tenuta «Gli Astroni» in agro del Comune di Pozzuoli (NA), sugli interventi silvicolturali da attuare e proposte per la sostituzione di una «Riserva Naturale». I.R.F., Napoli: 48 pagg.
- WOODWARD B.B., 1913 - Catalogue of the British species of *Pisidium* (Recent and Fossil) in the collections of the British Museum (Natural History) with notes on those of western Europe. London, 144 pagg., XXX Tavv.